Proceedings of the Sixth Conference on
African Linguistics. OSU WPL 20.241-259 (1975)

A Constraint on Deletion in Swahili*

Frank Roberts Brandon
Centro Unificado Profíssional
Rio de Janeiro, Brazil

1. Introduction

Much recent discussion within generative linguistics has centered around whether Chomsky's (1971, 1972) Standard Theory of Lakoff's (1971) Basic Theory (also Postal (1972b)) is best. A large part of the controversy has involved the assertion by Lakoff that languages contain Global Derivational Constraints. Global Derivational Constraints are rules which apply to two or more distinct structures in a derivation. Such rules are specifically denied by Chomsky (1972) on the grounds that they are overly powerful and unconstrained as theoretical notions and unnecessary in the description of linguistic facts. Indeed, in some cases, Global Derivational Constraints can be stated alternatively as more restricted Semantic Interpretive Rules, which apply to deep structure and surface structure only. Thus, the set of interesting cases for purposes of deciding between the two positions can be defined as those cases where more than two distinct structures or a structure different from the deep or surface structure must be referred to in order to adequately describe linguistic facts. The purpose of this paper is to show how some well known facts of Swahili, when properly described, point to the necessity of Global Derivational Constraints based on all of the above conditions. The particular constraint to be discussed cannot be handled within the Standard Theory without the ad hoc reordering of a syntactic rule to a point following several phonological rules.

2. Constraint

The constraint under discussion helps to guarantee that surface words in Swahili have at least two syllables. It operates by blocking the application of deletion rules when they would apply to segments of a two syllable word. It may be stated as:

(1) DISYLLABIC WORD CONSTRAINT: No deletion rule may apply to any segment of a two syllable word, where word is defined as #...#[1].

This constraint blocks at least three different deletion rules in Swahili: two phonological rules and one syntactic rule.

3. Data

I will begin by describing the data (familiar to students of Swahili) and then I will show how a proper account of the data demonstrates the need for Global Derivational Constraints by demonstrating the inability of the Standard Theory to handle the facts with non-global rules.

The first deletion rule I will discuss affects adjective agreement to nouns of classes 9 and 10. For classes 9 and 10, the lexical form of the adjective agreement affix is a nasal consonant without other feature marking. This nasal consonant is marked to agree with a following consonant in terms of the features [high], [back], [anterior], and [coronal] by a rule of ASSIMILATION. If a vowel follows, the features are marked for the palatal nasal /ɲ/ which does not agree in these four features with any other consonants of Swahili. This yields surface forms like:

(2) a. njia m-baya
(9)road AG9-bad (AG = AGreement Affix)
bad road
b. njia n-zuri
(9)road AG9-good
good road
c. njia ny-embamba
(9)road AG9-narrow
narrow road

The agreement affix is deleted preceding a voiceless consonant by a rule which may be written most simply by taking advantage of the fact that only this affix contains unmarked features:

(3) 9/10 ADJECTIVE AFFIX DELETION[2]

$$\begin{bmatrix} u\ \text{high} \\ +\ \text{affix} \end{bmatrix} \rightarrow \emptyset\ /\ \_\_\ [-\text{voice}]$$

This rule (ordered preceding ASSIMILATION) yields:

(4) a. njia pana
(9)road broad
broad road
b. njia fupi
(9)road short
short road
c. njia *m-pana
(9)road AG9-broad
broad road

However, in the case of the monosyllabic adjective stem -pya 'new', where the voiceless consonant /p/ should trigger the deletion rule (as in 4a), the rule of deletion is blocked, yielding (after ASSIMILATION applies):

(5) njia m-pya (cf. 4a and 4c)
(9)road AG9-new
new road.

The reason traditionally given for this is that the accent could not be placed on the adjective without the syllabic nasal /m̩/ since stress is normally placed on the penultimate syllable of a word. Later we will see that this is not a possible reason and that two syllable words are immune to deletion rules regardless of stress.

For class 5, in the same way, there is a rule which deletes the adjective agreement affix before a consonant.[3] This deletion rule may be written as

(6) CLASS 5 ADJECTIVE AFFIX DELETION

$$\begin{bmatrix} +\text{Affix} \\ +\text{Class 5} \end{bmatrix} \rightarrow \emptyset \; / \; \_\_ \; [+\text{consonantal}]$$

and will normally yield results like

(7) a. jani pana
(5)leaf broad
broad leaf
b. jani *ji-pana
(5)leaf AG5-broad
broad leaf

in which no overt marker is permitted. However, in the case of the monosyllabic adjective stem -pya 'new', this deletion rule is blocked, giving

(8) jani ji-pya (cf. 7a and 7b)
(5)leaf AG5-new
new leaf.

Again it might appear that the affix /ji/ is required to bear the accent. In the next set of data, we will find evidence that the proper generalization is different.

This third example of a deletion rule blocked by the DISYLLABIC WORD CONSTRAINT involves infinitive complements to a small class of verbs used as auxiliaries. These auxiliary verbs, which I will call 'modals' purely for convenience, are formed by the combination of a particular tense and verb root, such as -mekwisha 'have already V-ed' (literally: perfect tense + finish), -takuja 'will, will come to V-ing' (literally: future tense + come), and -aenda 'is going to be V-ed' (literally: indefinite present tense + go). Following these verbs, an optional rule applies which deletes the Class Affix of the infinitive noun (class 15) complement. The rule may be written as

(9) CLASS 15 AFFIX DELETION

$$[+\text{'Modal'}] \quad \begin{bmatrix} +\text{Affix} \\ +\text{Class 15} \end{bmatrix}$$

$$1 \qquad 2 \qquad \Rightarrow \quad 1, \emptyset$$

Condition: Optional.

This optional syntactic rule of deletion operates to yield:

(10) ni-me-kw-ish-a imb-a
I-perfect-CA15-finish-MV sing-MV (MV = Modal Vowel)
I have already sung

which may be compared with

(11) ni-me-kw-ish-a ku-imb-a
CA15-sing-MV
I have already sung

where the rule is not applied. Such pairs as (10) and (11) do not exist if the verb stem is monoconsonantal. Rather, the deletion rule is always blocked as in

(12) a. ni-me-kw-ish-a ku-l-a (cf. 11)
I-perfect-CA15-finish-MV CA15-eat-MV
I have already eaten
b. ni-me-kw-ish-a *l-a (cf. 10)
eat-MV
I have already eaten.

In all the cases discussed so far, a deletion rule has been blocked from applying to the stressed syllable of the word (i.e. ḿ-pya, jí-pya, kú-l-a where stress = '´'). However, stress can by no means be used to define the operation of the rule-blocking constraint. In fact, neither cyclical stress nor surface stress can account for all the cases where deletion rules are blocked. One set of cases which would resist an explanation based on the idea that syllables necessary to stress placement are not deleted is created by the application of a late rule of CONTRACTION. CONTRACTION attaches the locative verbs -ko, -mo, or -po to the verb w 'be' as in

(13) a. ni-me-kw-ish-a ku-w-á-ko Paris (stress = '´')
I-perfect-CA15-finish-MV CA15-be-MV-BE/LOCATED
Paris
I have already been in Paris
b. ni-me-kw-ish-a *w-á-ko Paris
be-MV-BE/LOCATED
I have already been in Paris.

Here the Class 15 Affix is not stressed at the surface level. Even if we allow a cyclic rule of stress assignment, there would be no

stress on the Class 15 Affix at the point where information about the preceding verb becomes available as can be shown.

(14) Underlying: $_{VP}$[ni-me-kw-ish-a $_{N}$[$_{N}$[ku-w-a]$_{N}$ko]$_{N}$]$_{VP}$

Cycle 1: Stress		kú-w-a
Cycle 2: Stress		ku-w-á- ko
Cycle 3: Deletion	ni-me-kw-ish-a	*w-á- ko

Here, a formulation which says that stressed syllables are immune to deletion would give wrong results (cf. 13b), even allowing stress rules to be part of the syntactic component as in Bresnan (1971, 1972).

In addition, there are even clearer cases where stress could never be assigned to the Class 15 Affix, as for instance

(15) a. ni-me-kw-ish-a kw-énd-a (derived from ku-énd-a)
I-perfect-CA15-finish-MV CA15-go-MV (CA15-go-MV)
I have already gone
b. ni-me-kw-ish-a *end-a
go-MV
I have already gone.

Stress could never be assigned to the /ku/ that underlies /kw/. Thus, in no way can the constraint which blocks these three[4] deletion rules be formulated in terms of stress. The only way of characterizing the environment where deletion is blocked is in terms of two syllable words, which define all the examples:

(16) #m pya#
#ji pya#
#ku la#
#ku wa#ko#
#kwen da#

The constraint merely guarantees the integrity of two syllable words, it does not specifically provide for two syllable surface words, since two syllable surface words would have remained in examples (13) and (15) even if deletion had applied. Thus the constraint is formulated as

(1) DISYLLABIC WORD CONSTRAINT: No deletion rule may apply to any segment of a two syllable word, where word is defined as #...#.

4. Rule Order

Now let us examine the question of where this constraint can be placed in the grammar. It is clear--at least for example (13) and others like it--that the constraint must be stated before the systematic phonetic level since the constraint must have access to internal word boundaries.[5] The constraint must follow all the rules which add syllables to the infinitive noun. This means all the rules which add derivational suffixes and the object agreement

rules must apply first since derivational suffixes and object agreement affixes are separated from the verb root only by formative boundaries. One of the derivational suffixes, the -an- reciprocal suffix, is derived by a late rule which operates on conjoined sentences. With this and other syntactic facts,[6] it is possible to establish that the constraint must be stated at least with the post-cyclic syntactic rules. However, the constraint must be placed even later because it must follow some phonological rules.

The principal of these phonological rules will be the one which converts the vowel of the Class 15 Affix ku into the corresponding glide as in example 15 (kw-end-a derived from ku-end-a). Those Class 15 Affixes which are not converted into consonant-glide sequences may delete as in example 10 (imb-a from ku-imb-a). This rule will be called GLIDE RULE. However, this particular application of GLIDE RULE is unusual because phonological rules in Swahili do not ordinarily apply preceding Noun or Verb Stems.[7] Such exceptional stems must be lexically marked, but this marking, while a necessary condition, is not sufficient. In addition, the word containing the marked stem must not have more than two syllables following the Class 15 Affix in order to undergo the GLIDE RULE. Thus the exceptional stems will be marked to undergo GLIDE RULE after the application of all syllable adding rules (as in the last paragraph) by a rule, EXCEPTION RULE, which appears to be a readjustment rule as defined in Chomsky and Halle (1968) since it alters the syntactic description of a form to ready it for the proper application of phonological rules. The alteration involves changing the value of the feature [Obligatory Affixation] which separates Noun and Verb Stems from all other stems.

(17) EXCEPTION RULE

$$\#\ CV \quad \begin{bmatrix} +\text{Affix} \\ +\text{Noun} \end{bmatrix}^{+}\ VC_1V \quad \begin{bmatrix} +\text{Obligatory Affixation} \\ +\text{Lexical Feature } ' \ ' \end{bmatrix} \#$$

$$[-\text{Obligatory Affixation}]$$

The EXCEPTION RULE feeds the GLIDE RULE.

(18) GLIDE RULE

$$\begin{bmatrix} +\text{vocalic} \\ +\text{affix} \end{bmatrix} \rightarrow [-\text{vocalic}] \ / \ \left(\begin{bmatrix} +\text{consonantal} \\ -\text{coronal} \end{bmatrix}\right) \_\_ \begin{bmatrix} +\text{vocalic} \\ -\text{Obligatory} \\ \text{Affixation} \end{bmatrix}$$

The application of these two rules gives such forms as

(19) #kw+end+a# (from #ku+ end +a#) 'to go'
[+'X']
#kw+ish+a# (from #ku+ ish +a#) 'to finish'
[+'X']
#kw+ib+a# (from #ku+ ib +a#) 'to steal'
[+'X']
#kw+it+a# (from #ku+ it +a#) 'to call'
[+'X']

and the following cases where the EXCEPTION RULE cannot apply because its phonological description is not met (although the Lexical Feature 'X' is still part of the root) and so the GLIDE RULE does not apply either:

(20) ku+i+ib+a (i is introduced by object agreement)
ku+it+w+a (w is the passive affix)
ku+end+e+a (e is the prepositional affix)
ku+wa+ish+a (wa is introduced by object agreement).

The forms of (19), but not of (20), meet the structural description of DISYLLABIC WORD CONSTRAINT and so are immune to deletion as in example (15). In this way, GLIDE RULE provides the definition of the point at which DISYLLABIC WORD CONSTRAINT can be stated.[10]

From this we can see that DISYLLABIC WORD CONSTRAINT must be stated following EXCEPTION RULE and GLIDE RULE and preceding the Systematic Phonetic level in order to correctly define the cases in which deletion rules are blocked. We can also place the three deletion rules in the grammar. CLASS 15 AFFIX DELETION is a purely syntactic rule which only refers to syntactic information. CLASS 9/10 ADJECTIVE AFFIX DELETION is a purely phonological rule ordered following the phonological rule of ASPIRATION which adds aspiration to voiceless consonants in the presence of a class 9 or class 10 affix and preceding the rule of ASSIMILATION. CLASS 5 ADJECTIVE AFFIX DELETION is a phonological rule with syntactic conditions which cannot be ordered relative to the other rules. Thus the three rules and the constraint may be located at as many as four different points in the grammar. The constraint and the two phonological deletion rules could be sequential since there is no evidence against this possibility, but there is no evidence for this either. In any case the three deletion rules must be related to the constraint by some means.

5. Possible Solutions

In order to appreciate the implications of these facts, let us see how they can be treated within the Standard Theory. In this theory, all syntactic rules apply, followed by readjustment rules, and then the cyclical phonological rules followed by the word level rules. The constraint and the phonological deletion rules would be word level rules. Exceptions (such as the one defined by DISYLLABIC WORD CONSTRAINT) may be handled within the Standard Theory by a number of devices. One of these is lexical marking of exceptions. Others are the 'minus next rule' convention and

readjustment rules which mark exceptions. These rules take as their environment the intrinsic content of the formative affected.

5.1. Lexical Marking. Lexical marking of the exceptions will be rejected out of hand. This is not because the data can not be handled this way. On the contrary, if -pya is marked as [-CLASS 9/10 ADJECTIVE RULE DELETION, -CLASS 5 ADJECTIVE AFFIX DELETION] and the approximately fifteen verb roots which are exceptions to CLASS 15 AFFIX DELETION are so marked, then the data can be handled, provided that CLASS 15 AFFIX DELETION is rewritten so that its structural description includes the structural description of EXCEPTION RULE in some way, since this remains part of the description of exceptional stems. EXCEPTION RULE will still be independently required to define possible inputs to GLIDE RULE. Thus with some duplication, lexical marking handles the data. However, by using lexical marking, we not only cover up the generalization expressed by DISYLLABIC WORD CONSTRAINT, but we claim that there is no principled relation between the various exceptions. This claim is clearly false and it is no coincidence that all are disyllabic words.

5.2. Expansion of the Standard Theory. As set forth in Chomsky and Halle (1968), the other two devices for handling exceptions cannot be used to express the generalization of the constraint either because the exceptions are based on an environment outside the particular formative (the affixes in this case) which is to be marked as an exception. An extension of these rules to take environment into account, called 'negative context' rules, was mentioned and rejected in Chomsky and Halle (1968) on the grounds that no such rule had been necessary in the sample of languages they had studied. The context in this case will be the number of syllables including the affix. Since the affix must be included in the count of syllables, the rule would have to be written like a transformational rule instead of like an ordinary phonological rule. Writing the rule this way, we may place it before any rule it affects and it will mark two syllable words as exceptions by the convention [-Next Rule]. This means that the constraint would have to be stated at least three times--once for each rule of deletion. The number of times the constraint must be stated cannot be reduced even if we take up another rejected modification in such rules and allow it to name the rules it marks exceptions for, unless we allow the rule to mark every item as exempt for all three rules of deletion by name. This is somewhat vacuous since it is obvious that the adjective agreement affixes do not need to be exempt specifically from CLASS 15 AFFIX DELETION and vice versa. Here we might simplify by allowing the constraint to refer to the form of the rules it blocks, in this case the common structural change that defines deletion rules:...→ Ø... which can be included in a minus feature as [-Rule containing ...→ Ø...]. Now we can state one constraint for all the rules if we can order them after the constraint.

The constraint follows some phonological rules, but there is no reason that the phonological deletion rules should not be ordered following it. The only reason for so ordering them is to permit the use of exception marking devices available to the Standard Theory. Even so, we cannot account for the syntactic rule of deletion since it will precede any phonological rule or phonological constraint. For the same reason, it will not help to state the constraint as a readjustment rule either. If we try to state the exception marking rule before the syntactic deletion rule, the phonological environment does not exist. If we allow the constraint to know what rules will apply later in the derivation, then it becomes global.[11] Since, by definition, the Standard Theory excludes global rules and is thereby distinguished from the Basic Theory of Lakoff (and others), it is necessary to find some other solution.

A possible solution which conserves this feature of the Standard Theory (non-globality of rules) is to allow the syntactic rule of deletion to be placed in the phonological component.[12] By allowing a purely syntactic rule to be placed following a number of purely phonological rules and accepting all the other expansions of the Standard Theory which have been suggested in the preceding paragraphs, it becomes possible to account for the facts without global derivational constraints. However, it should be obvious that this solution is ad hoc and very expensive. The Standard Theory--without global rules--very nearly does not permit the statement of the simple generalization contained in the DISYLLABIC WORD CONSTRAINT (1). But before giving up entirely the notion that global rules are <u>not</u> part of language, let us examine other devices for describing facts which are more powerful than those we have so far tried to use and which are compatible with the Standard Theory.

5.3. <u>Kisseberth's Constraints</u>. First, let us see if the data can be handled using the derivational constraints suggested by Kisseberth (1970). The type of derivational constraint he proposes can block the application of a rule if its output is deviant in some way. The constraint can also refer to the input for purposes of comparison in determining the acceptability of the output. Using this powerful descriptive device, it is possible to handle most of the cases with the following

(21) NON-GLOBAL DERIVATIONAL CONSTRAINT: No rule may have in its output a monosyllabic word which was not in its input, where word is defined by #...#.

The constraint (21) still does not handle the cases where the output will be disyllabic but still unacceptable (the cases defined by the application of the GLIDE RULE). In order to account for these, we can alter the constraint to recognize exceptional disyllabic stems. This requires curly brackets (an either/or condition) and the introduction of defining features giving:

(22) NON-GLOBAL DERIVATIONAL CONSTRAINT: No rule may have in its output either (1) a monosyllabic word which was not monosyllabic in the input or (2) a disyllabic word marked with [+Obligatory Affixation] which was trisyllabic in the input, where word is defined for both (1) and (2) as #...#.

The condition on input and the feature in (2) above allow EXCEPTION RULE and GLIDE RULE to apply without being blocked by the constraint. The generalization that two syllable words are exceptions to deletion rules is completely covered up. The constraint (22) is really two separate constraints which have nothing in common: monosyllabic words are not created and trisyllabic N or V are not reduced. Thus it really claims that it is a coincidence that all the exceptions are disyllabic words. Here, once again, it is seen that a high price must be paid to obtain an ad hoc and descriptively inadequate solution, simply to avoid accepting global derivational constraints as part of language.

5.4. Other Single Level Constraints. Just as no early conditions (such as lexical marking) can give a clear account of the facts, so no late condition such as Shibatani's surface phonetic constraints can do so either. Since the history of a form and nothing intrinsic to its phonetic representation defines its acceptability, surface phonetic constraints cannot even mark all the unacceptable forms. Since surface phonetic constraints cannot block the application of earlier rules, they cannot play a role in the derivation of all the acceptable forms. For any late single level condition to work, it would have to recreate the effect of the deletion rule as an insertion rule[13] which is not motivated.

5.5. Multilevel Constraints: Global Constraints. At this point, it should be apparent that there is no non-global solution which will accurately capture the generalization which describes the facts without the ad hoc reordering of a syntactic rule after some phonological rules. The best solution developed while trying to handle the facts within the Standard Theory was (5.2) the one which allowed exception marking rules to refer to a context, be written like transformational rules, refer to other rules on the basis of their structural properties (e.g., deletion rules), and be placed wherever they could properly describe the facts. The problem with this expansion of the Standard Theory was that it did not have the property of globality. In fact, this solution was very close to being a Global Derivational Constraint as defined in Lakoff (1971) and Postal (1972). Global Derivational Constraints are written like transformational rules and refer to contexts. They may refer to properties available for the formulation of transformational rules. What makes them different is the fact that they may be stated on multiple levels, each such level being defined by a transformational rule. In the case being

examined in this paper, the levels may be restricted to those defined by GLIDE RULE, following which it is possible to state the constraint, and by the three deletion rules: CLASS 9/10 ADJECTIVE AFFIX DELETION, CLASS 5 ADJECTIVE AFFIX DELETION, and CLASS 15 AFFIX DELETION. It is just as possible to generalize to all deletion rules. Thus the DISYLLABIC WORD CONSTRAINT may be written as the following Global Derivational Constraint:

(23) DISYLLABIC WORD CONSTRAINT[14]: If, following GLIDE RULE, A is a two syllable word (word being defined by #...#), then no constituent corresponding to A has ever or will ever be a possible input to a deletion rule (defined as a rule containing ...→ Ø...).

What is crucial for distinguishing cases like kw-end-a from cases like ku-imb-a (cf. examples (10), (11), and (15)) is for the rule of deletion to have access to the future operation of GLIDE RULE ('future' in the sense of the cyclical orientation of the rules). This particular Global Derivational Constraint is unusual not only in its need for forward globality (see also Wilkinson (1974)) but in that it may refer to as many as four levels, none of which is the semantic level. This means that the constraint on the form of Global Rules suggested by Postal (1972) that, if more than two levels were referred to, one would be the semantic representation cannot hold. All the other conditions do hold however.

6. Conclusion

In conclusion, I have tried to show that, although transformational generative grammar is too powerful and needs to be restricted, it is not possible to exclude Global Derivational Constraints without losing the power to adequately describe facts of natural languages. Restrictions on transformational theory can only come about through intensive study of a wide variety of languages leading to an understanding of the natural limitations of the power of grammars. I have also tried to show that one consequence of excluding global derivational constraints is that the notions phonological component and syntactic component lose content, since rule order can not then be formulated in terms of this division of rules. Even if this division of rules into two components is abandoned, rules like Global Derivational Constraints are still required (as was pointed out above) even if in this case globality is not needed. Only further work with global derivational constraints and with the interaction of syntax and phonology will give a final answer to the questions raised in this paper, although it seems that Global Derivational Constraints will be needed to describe human languages.

Footnotes

*The development of this work was funded by the Centro Unificado Profíssional. It is based on data supplied by the late Ali A. Farsi, his wife Hujeijah, and her brother Nassir Farsi, all Zanzibaris.

[1]Word formation will be based on a convention like that of Chomsky and Halle (1968). The nodes labeled S, N, V, Adj(ective), ADV(erb), and Prep(osition) will receive # on each side (e.g. #S#, #N#, etc.). Word will be defined by single word boundaries #...# in this paper, but only sequences of two word boundaries may be realized phonetically as a pause and thus define 'surface word'.

[2]This rule allows us to avoid the use of curly brackets by taking advantage of the fact that at least four features of this affix are unmarked when it is introduced. The feature chosen is arbitrary (for the group of four unmarked features). The cost of writing the rule this way is that ASSIMILATION, which marks the features, must be ordered following CLASS 9/10 ADJECTIVE AFFIX DELETION.

The alternative, with no order between ASSIMILATION and the deletion rule would be:

(i) DELETION

$$\left[\begin{array}{l}+\text{Affix} \\ \left\{\begin{array}{l}+\text{Class 9} \\ +\text{Class 10}\end{array}\right\}\end{array}\right] \rightarrow \emptyset \; / \; \_\_ \; [-\text{voice}]$$

The plural of class 14 will simply be identified with class 10.

It should be noted that this rule no longer applies synchronically to nouns. The class 9/10 noun affix is Ø and not N today.

[3]The affix is given as /ji/ because of this case, the monosyllabic noun stems (where the class affix is /ji/ too), and the fact that /ji/ would be reduced to /j/ before vowels by the general rule of VOWEL LOSS. VOWEL LOSS reduces CV affixes to C preceding the vowel of a form which is marked [-Obligatory Affixation]. (This feature is explained in footnote 7.)

(i) VOWEL LOSS

$$\left[\begin{array}{l}\text{V} \\ \alpha\text{high} \\ +\text{affix}\end{array}\right] \rightarrow \emptyset \; / \; \left[\begin{array}{l}\text{C} \\ \alpha\text{coronal}\end{array}\right] \_\_ \left[\begin{array}{l}\text{V} \\ -\text{Obligatory} \\ \text{Affixation}\end{array}\right]$$

This rule accounts for the following alternations:

(ii) zi/z, li/l, ni/n, ji/j, wa/w, ma/m, ya/y, pa/p

[4]There is a possible fourth rule. It is identical in every way to CLASS 15 AFFIX DELETION except that it is obligatory and not optional. This rule is triggered by Tenses and accounts--

along with DISYLLABIC WORD CONSTRAINT--for such alternations (Class Affix 15 or nothing) as:

(i) a. ni-na-kw-end-a
I-present-CA15-go-MV
I am going
b. *ni-na-end-a
c. ni-na-ku-l-a
I-present-CA15-eat-MV
I am eating.
d. *ni-na-l-a.
e. ni-na-imb-a
I-present-sing-MV
I am singing
f. *ni-na-ku-imb-a
I-present-CA15-sing-MV

For further discussion of these cases and how they fit into the treatment given above, see my dissertation (Brandon 1974).

Although I will not argue for the following points here, I would change the treatment of Brandon (1974) in order to accomodate the more general constraint on deletion (1) in these ways:

Since, for some speakers, deletion of the Class 15 Affix is always optional following any 'Modal' Auxiliary and since the deletion rule following tenses is identical in every way except optionality, I would treat the optionality as a function of relexicalization. Thus a 'Modal' Auxiliary like nimekwisha 'I have already V-ed' would have two possible underlying forms: one derived from the verb ish 'finish' by joining it to the tense me 'perfect' and the other in which the string mekwisha has been lexicalized and marked with some of the features of a tense. In the former case, the deletion rule would not be triggered. In the latter case, the rule would be triggered by the same features which all tenses possess. This way the rule is always obligatory and we capture the fact that 'Modal' Auxiliaries are usually early stages in the relexicalization process that leads to new tenses in Swahili (such as the -mesha- tense recently derived from -mekwisha- and having the same meaning).

It should be noticed that there are tenses which do not show any evidence of the function of the DISYLLABIC WORD CONSTRAINT. They trigger deletion, but deletion is not contrained in any way. For this group of tenses, I will propose that there exists a (readjustment?) rule which erases the internal word boundary between the Tense and the infinitive noun, thus destroying the boundary which is necessary to continue defining the infinitive noun as a word. When this happens then the infinitive noun is simply part of the finite verb which is the first word available to the constraint: e.g.

(ii) #ni+na#ku+l+a# - the ku cannot delete because of Constraint
#ni+ki+ku+l+a# becomes #ni+ki+l+a# because the Constraint finds no two syllable word

For explanations of this analysis and reasons for eliminating other alternative analyses of finite verbs, see especially chapters 4 and 5 of my dissertation.

[5]Shibatani (1973) claims in his footnote 16 that internal word boundaries would be available at the systematic phonetic level although he gives no arguments for this claim. If this were so, the DISYLLABIC WORD CONSTRAINT could be stated at the systematic phonetic level--and perhaps should be, since (except for its awareness of internal word boundaries) it appears to be a phonetic constraint. This would not change the form of the arguments presented in the paper, since it would be even worse to reorder a syntactic rule after a phonetic constraint.

[6]See sections 4.1 to 4.3 of Brandon (1974).

[7]Most of the phonological rules of Swahili have a general morphological condition on them. The condition could be stated very generally as

(i) Phonological rules change affixes in the environment of stems (usually [-Obligatory Affixation]).

All of the rules discussed in this paper obey this generalization. Some purely phonological (without morphological conditions) rules exist, such as the rule which converts ky to č and the rule that inserts i between vowels in derivational suffixes of verbs. Rules which obey the general morphological condition generally only accept stems which are marked as [-Obligatory Affixation]. The feature[Obligatory Affixation] separates Noun and Verb Stems on one side from Adjective, Tense, Demonstrative, Relative, and Quantifier Stems on the other. The feature--although it defines two large morphological classes for the purposes of phonological rules--is not arbitrary. It is a lexical feature which determines the operation of the syntactic lexical rule of Obligatory Affixation which adds a Class Affix to noun and verb stems. See section 5.5 of Brandon (1974) also.

[8]Since only verb stems show the kind of alternations based on number of syllables described by this rule, the rule is too general since it refers to stems in general. This economy is allowed by the fact that the Lexical Feature 'X' can only be of use with Verb Stems. There are Noun Stems which are also exceptions, but not all of them are only two syllables in length which means that some other Exception Marking Readjustment Rule must handle them, using a different Lexical Feature since nouns so marked would be unconditionally readjusted so as to undergo phonological rules.

It would also be possible to write a Special Glide Rule exclusively for Class 15 Affixes by combining the GLIDE RULE and the EXCEPTION RULE, but since the GLIDE RULE already accounts for other ku/kw alternations, duplicating part of it as another rule would merely complicate the grammar and disguise the fact that a genuine exception is being described.

[9]The GLIDE RULE follows IDENTICAL VOWEL COLLAPSING which deletes a vowel identical to an adjacent vowel when one vowel is

part of an affix and the other is part of a stem marked [-Obligatory Affixation]. This order allows GLIDE RULE to be written without restrictions on the vowels involved, besides being a 'natural' order. GLIDE RULE accounts for the following alternations in Affixes:

(i) i/y, vi/vy, mi/my, ki/č (from ky by another rule), ku/kw, mu/mw, u/w

The loss of the glide /w/ in some circumstances is described in footnote 10 below.

[10]There is an exceptional variation k-og-a from ku-og-a 'to bathe' which should have become *kw-og-a because of the GLIDE RULE. Obviously, k-og-a meets the description of the DISYLLABIC WORD CONSTRAINT, but so does *kw-og-a. Thus we can state the constraint after GLIDE RULE (minimal conditions are first met at this point) and allow the rule of GLIDE LOSS to follow the constraint without any problems. The rule of GLIDE LOSS is necessary for the proper surface forms. This rule is not written as a rule of U LOSS preceding the GLIDE RULE since /u/ is permitted on the surface where /w/ is forbidden by surface phonetic constraints which are apparently the motivation for this rule of GLIDE LOSS. The /w/ of an affix is lost in every context preceding the rounded vowel of a stem (marked [-Obligatory Affixation]) unless it is preceded by two word boundaries. Taking advantage of the conventions of Chomsky and Halle (1968) on segment marking, the rule can be written very simply as

(i) GLIDE LOSS

$$\begin{bmatrix} w \\ +\text{Affix} \end{bmatrix} \rightarrow \emptyset \;/\; [+\text{segment}]\ [-\text{segment}]\ \begin{matrix} 1 \\ 0 \end{matrix} \text{ —— } \begin{bmatrix} V \\ +\text{round} \\ -\text{Obligatory} \\ \text{Affixation} \end{bmatrix}$$

The results of this rule are

(ii)	yo yote	(*ywo ywote)
	mo mote	(*mwo mwote)
	ko kote	(*kwo kwote)
	koga	(*kwoga)
	wo wote	(does not apply because ##wo##wote##)
	anaokata	(not anawokata)
	atakao	(not atakawo because a+tak+a#wo)

[11]It should be pointed out that circularity is not the same as globality. By circularity, I mean the type of grammar we have if we follow the arrows in figure 1 of Halle (1973) which unfortunately are not explained in the text. By these arrows, it would seem that a derivation, having passed through the phonological component may pass through the word formation component and back into the syntactic component. Since Halle does not explain his claim that he has been able to eliminate derivational constraints by the use of word formation rules preceding the syntax, we can

guess that he must mean that derivational constraints can be eliminated either by placing phonological rules (i.e. word formation rules) before the syntactic rules or by filtering information from the phonological component through the word formation rules (i.e. phonological rules which precede syntax). This is a variation of the possible solution which reorders the syntactic deletion rule following the phonological rules which can bleed it, in which a new component is set up to include all the phonological rules which might affect syntactic rules. This is no more arbitrary than the solution just invented in the text of this paper, except that the arbitrariness is concealed somewhat by the concept that there are two sets of phonological rules: one preceding and one following the syntax. Further studies by Halle and others will no doubt show what the empirical content of this theory is, but at this point it would seem simpler to abandon the notion of a syntactic and a phonological component and allow all the rules to mix freely, being ordered by a general principle or principles like those discussed in Koutsoudas, Sanders, and Noll (1974). If, on the other hand, Halle intends us to understand that information is sent back from the phonological component to the syntactic component, then the solution will be a variation on derivational constraints like Kisseberth's. A pair of features designating a possible mistake by the syntactic deletion rule would be sent back to the syntactic component where the syntactic rule would undo its mistake if it is sensitive to that pair of features. The unfortunate effect of this possible circular solution is that it covers up the generalization that two syllable words are immune to deletion.

[12]There are rules of phonology which have been accepted as part of the cycle of syntax (Bresnan (1971, 1973)), but the rules discussed here are not cyclic and are typical syntactic and word level phonological rules. The only argument for reordering in the case presented here is to avoid globality in grammar.

Dinnsen (1974), in his attempt to restrict derivational constaints of the type developed by Kisseberth, notices the very interesting fact that global rules in phonology usually involve deletion. He uses this fact to restrict global rules by allowing deletion rules to mark the forms they affect with a feature which is cost-free: the null segment, $\emptyset$ (which is later deleted by a universal rule, which naturally adds no cost to individual grammars). This allows derivational history to be encoded for deletion rules. It should be clear that this solution is the same as the one discussed in the text concerning derivational constraints like Kisseberth's. This solution requires reordering of rules in order to function. It may be that Dinnsen is advocating the reordering of syntactic rules following phonological rules based on some universal sequencing principles and an absence of extrinsic order. Only in this way can we make sense of the fact that Cook (1971) is cited in the references of Dinnsen's paper. Cook's data are like mine in that phonological rules determine whether syntactic rules can apply. The only way that the Null Segment Hypothesis can handle these data is if Cook's four syntactic deletion rules are ordered to follow his two phonological rules. It could be

that Dinnsen hopes to control the phonological rules through the syntactic rules, but this is not possible as I read Cook's data. Unfortunately, Dinnsen does not try to reformulate Cook's solution in terms of his Null Segment Hypothesis.

What is of more interest for this paper is not the fact that the Null Segment Hypothesis cannot handle the data at all, but the possibilities for principled rule reordering that are also suggested by Dinnsen. First, it should be noted that if the GLIDE RULE gets a Ø from CLASS 15 AFFIX DELETION, there is no way it can be cued to reinsert a /k/ or a /kw/ (see note 13). If we reorder, the deletion rule can be written to be sensitive to the operation of the GLIDE RULE, but <u>not</u> by a null segment. Second, what reason could be given for reordering the syntactic rule after the phonological rules? Dinnsen reports a personal communication from G. Sanders and G. Iverson in which they propose a RADICAL CHANGE PRECEDENCE which is a principle saying that deletion and insertion rules should precede feature changing rules. This principle would place CLASS 15 AFFIX DELETION before GLIDE RULE and the DISYLLABIC WORD CONSTRAINT, just as is proposed in this paper--thus requiring Global Rules. When we turn to the other principles proposed by Koutsoudas, Sanders and Noll we find that the situation is the same. The principle of PROPER INCLUSION PRECEDENCE places a rule applying to a larger context prior to a rule which applies to a properly included subcontext. Thus, CLASS 15 AFFIX DELETION would precede EXCEPTION RULE and GLIDE RULE and the Constraint would again have to be global. The Constraint and the syntactic deletion rule are in a bleeding and counter-bleeding relationship. This relationship is defined by the PROPER INCLUSION PRECEDENCE as noted above, leaving the syntactic rule preceding and requiring a global statement of the generalization. The non-extrinsic ordering principles force us to admit globality in language or to simply cover up the DISYLLABIC WORD CONSTRAINT and claim that no generalization exists and that it is a mere coincidence all forms which are immune to deletion are also disyllabic after the application of GLIDE RULE. As a matter of fact, we can observe that these principles would place EXCEPTION RULE before CLASS 15 AFFIX DELETION. Unfortunately the way the rules are written this order, in itself, would leave us with forms marked to undergo the GLIDE RULE but lacking the affix <u>ku</u> which GLIDE RULE would affect. However we can reformulate the rules. EXCEPTION RULE will not only prepare stems to undergo GLIDE RULE but will in addition mark all such forms as [-next rule]. Monoconsonantal verb stems and monosyllabic adjective stems will be marked in the lexicon as being exempt from deletion. The data is handled. The generalization is lost. At this point, it must be clear that the best alternative to Global Derivational Constraints is the expansion of the Standard Theory first offered with the <u>extrinsic</u> reordering of syntactic rules following phonological rules. Such a solution <u>at least</u> can state the generalization which is simply unstateable in the non-extrinsic theory just discussed without global rules.

[13]For a demonstration of the impossibility of rewriting the deletion rule as an insertion rule, see section 4.4 of Brandon (1974).

[14]The general statement of DISYLLABIC WORD CONSTRAINT would also block the deletion of suffixes. There is no problem in this since the rules which apply to suffixes can be written as rules of insertion. These rules insert vowels between consonants and /l/s between vowels. The vowels could be inserted or deleted with equal facility, but it is easier to write an /l/ insertion rule than a deletion rule. The general statement of the constraint could also be taken as a motivation for the relexicalization of monosyllabic noun plus suffix as in the case of pwani 'coast' and chini 'ground, bottom' both historically derived from a word of approximately the same meaning by the addition of the -ni locative suffix. This might also explain or motivate the development of the class of tenseless verbs -na 'be with', -ko 'be located around, at', -po 'be located right at, on', -mo 'be located inside', -hai 'be alive' (in the speech of my principal informant). (See section 5.2 and footnote 5 in Brandon (1974)).

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